



Boiler Auxiliaries Plant,  
**Bharat Heavy Electricals Limited,**  
Ranipet - 632406, Tamilnadu, INDIA.

Enquiry No. & Dt.:	BAP/CAPITAL/2012-13/OT-3 dt. 11.07.2012
Due Date :	
Supplier's Ref.:	
Date :	

**Annexure-C: Specification cum Compliance Certificate for CNC VERTICAL TURNING LATHE (Dia 6000mm)**

Note:-

1. The 'Offered' Column and where applicable, the 'Deviations' & 'Remarks' Column of this format shall be filled in by the Vendor and submitted along with the offer. Inadequate / incomplete, ambiguous or unsustainable information against any of the clauses of the specifications / requirements shall be treated as non-compliance.

2. The offer and all documents enclosed with offer should be in English language only.

Name & Address of the supplier:	Name & Address of the Indian Agent:
Telephone No.	Telephone No.
Fax No.	Fax No.
e-mail :	e-mail :

Scope: Supply, Erection & Commissioning of **CNC VERTICAL TURNING LATHE (Dia 6000)** complying with specification as below.

S No.	Description - BHEL's Requirement	Specified	Offered	Deviations	Remarks
<b>1.0</b>	<b>PURPOSE &amp; WORK PIECE MATERIAL</b>				
1.1	<b>Purpose:</b> This machine is required to rough & finish machine the components of Power Plant Fans/Air-Heaters etc. including bearing locations. <i>Operations: All VTL operations like Turning, Boring, Grinding etc.</i>	Vendor to note			
1.2	<b>Work Piece Material:</b> Carbon Steel, Alloy Steel, Stainless Steel, Cast Iron, Cast Steel etc. Hardness 20-30 HRC.	Vendor to note			
<b>2.0</b>	<b>SPECIFICATION:</b>				
<b>2.1</b>	<b>MACHINE CONFIGURATION</b>				
2.1.1	Heavy Duty CNC Double Column Vertical Turning Lathe, Single ram tool head on Cross rail with ATC.	Vendor to note and furnish details.			
2.1.2	The machine should be equipped with Internal Grinding Facility.	Vendor to note			
<b>2.2</b>	<b>CAPACITY &amp; SIZE</b>				
2.2.1	Maximum Work piece Height for Turning & Facing	4000 mm			
2.2.2	Maximum Turning Diameter	6000 mm			
2.2.3	Maximum Work piece Weight	25000 Kg			
2.2.4	Maximum Swing Diameter	Vendor to specify			
2.2.5	Minimum Boring Diameter (Using standard turning tool holder & tool clamped on the ram)	500 mm			

2.2.6	Over all height of the machine from shop floor level	Vendor to specify			
<b>2.3 TABLE</b>					
2.3.1	Table Diameter (Min.)	5000 mm			
2.3.2	Load carrying capacity (Max.)	25000 Kg.			
2.3.3	Table Speed ( Infinitely Variable )	Min. - 2 rpm; Max. - 40 rpm or more			
2.3.4	No. of Speed ranges	2- 3 steps			
2.3.5	Power of Main Drive ( S1 - Continuous Rating ) AC Servo Motor	Minimum 100 KW			
2.3.6	Details of Main Drive viz. Type, Make, Model etc.	Vendor to inform			
2.3.7	No. of Jaws / Vices	4			
2.3.8	Maximum External Clamping Diameter	Vendor to inform			
2.3.9	Minimum External Clamping Diameter	Vendor to inform			
2.3.10	Maximum Internal Clamping Diameter	Vendor to inform			
2.3.11	Minimum Internal Clamping Diameter	Vendor to inform			
2.3.12	Clamping Force of each Jaw.	Vendor to inform			
2.3.13	Positions and Dimensions of the Jaws on Table. Chucking Capacity Diagram should be submitted.	Vendor to inform & Submit			
2.3.14	Type of force multiplier mechanism used in jaws should be explained and drawings should be submitted.	Vendor to submit details.			
2.3.15	Maximum permissible Cutting Force	Vendor to inform			
2.3.16	Maximum permissible Torque	Vendor to inform			
2.3.17	RPM at which Max. Torque is available.	Vendor to inform			
2.3.18	Table Torque - Speed diagram should be submitted.	Vendor to submit			
2.3.19	Type of Bearing for the Table (Hydrostatic / Non-Hydrostatic)	Vendor to inform			
2.3.20	Bearing of the table should be well-protected from grinding slurry etc. Details to be submitted	Vendor to confirm & submit			
2.3.21	Size of T - slots, their position and accuracy. Drawing of Table showing details of the T - slots etc. should be submitted.	Vendor to submit			
2.3.22	Two perpendicular accurate Slots should be provided at the Center of the table to use for alignment purposes. Sizes ( Width & Depth ), accuracy etc. of these slots should be furnished along with a Drawing.	Vendor to inform & Submit			
2.3.23	Table Loading Diagram should be submitted (Load v/s Distance from Table Center) for uniform as well as for eccentric loading.	Vendor to submit			
2.3.24	Diameter, Depth and Accuracy of Center Bore on Table Top Surface.	Vendor to submit			
2.3.25	The machine table shall be of single piece construction (Material -Annealed Cast Steel)	Vendor to confirm			

2.3.26	Weight of the table with bearing	Vendor to furnish			
<b>2.4 CROSS RAIL</b>					
2.4.1	Vertical Travel	Vendor to specify			
2.4.2	Vertical Traverse Rate.	Vendor to specify			
2.4.3	No. of Positions.	Vendor to specify			
2.4.4	Distance between each Position	Max. 250 mm			
2.4.5	Distance of lowest Step from Table Top	Vendor to specify			
2.4.6	Distance of highest Step from Table Top	Vendor to specify			
2.4.7	Maximum Height of Cross Rail bottom from Table Top	Vendor to specify			
2.4.8	Minimum Height of Cross Rail bottom from Table Top	Vendor to specify			
2.4.9	Movement of Cross Rail : Through NC Program as well as manually by Push Buttons - should be confirmed.	Vendor to confirm			
2.4.10	Machine Reference Point should be at Ram Reference Point and it should be updated automatically with movement of Cross Rail - should be confirmed.	Vendor to confirm			
2.4.11	Details of cross rail movement	Vendor to submit			
2.4.12	Cross rail clamping method - By hydraulic system.	Vendor to confirm			
2.4.13	Method of counter balancing	Vendor to furnish with details			
<b>2.5 TOOL HEAD and RAM</b>					
2.5.1	No. of Columns	2			
2.5.2	No. of Guide ways for cross rail movement	2 per column			
2.5.3	No. of Ram	1			
2.5.4	RAM Size	Vendor to specify			
2.5.5	Ram counter balancing - By Hydraulic system	Vendor to confirm			
2.5.6	Cross - Section of Ram (It should be rigid enough for trouble free machining with maximum projection of ram and also suitable for specified minimum bore dia)	Vendor to inform			
2.5.7	Thread Cutting Capacity - maximum Pitch	Vendor to inform			
2.5.8	Minimum dia of bore using ram	Vendor to inform			
2.5.9	Clamping details for mounting Turning Tool Holders/Attachments on ram, should be submitted.	Vendor to submit			
2.5.10	Clamping Force Available for clamping of Turning Tool Holders/Attachments.	Vendor to inform			
2.5.11	Mounting of Turning Tool Holders and Attachments should be automatic through Program as well as manually through push Buttons	Vendor to confirm			
2.5.12	Tool Holder clamping method (Hydraulic/mechanical/Hydro Mechanical)	Vendor to furnish			

2.5.13	Max. size of Tool Holder to be clamped	Vendor to furnish			
<b>2.6 MAIN TRAVERSES</b>					
2.6.1	Vertical Travel of Ram (Z-Axis)	Minimum 2000 mm			
2.6.2	Horizontal Travel of Ram ( +ve X - Axis )	Vendor to specify			
2.6.3	Horizontal Travel of Ram beyond Center of the Table ( -ve X - Axis )	Minimum 200 mm			
2.6.4	Max. Distance between Table Top & Standard Turning Tool Holder with Tool	Vendor to inform			
2.6.5	Min. Distance between Table Top & Standard Turning Tool Holder with Tool.	Vendor to inform			
2.6.6	Max. Distance between Table Top & Vertical Milling Head with Cutter.	Vendor to inform			
2.6.7	Min. Distance between Table Top & Vertical Milling Head with Cutter.	Vendor to inform			
<b>2.7 MACHINE GUIDE WAYS:</b>					
2.7.1	Width of Cross Rail guide ways	Vendor to inform			
2.7.2	Width of column guide ways	Vendor to inform			
2.7.3	The X & Z guide ways shall be hardened and ground	Vendor to submit details			
2.7.4	Hardness of guide ways (50-58 HRC) for both X & Z Axes.	Vendor to confirm			
2.7.5	<u>Metallic Telescopic Covers</u> of rust resistant material should be provided with wipers for all axes guide ways. Provision to avoid mixing of coolant / lubrication oil should be provided.	Vendor to offer			
<b>2.8 FEEDS AND DRIVE SYSTEM:</b>					
2.8.1	Cutting feed in X - Axis (Infinitely Variable)	0 - 2000 mm/min			
2.8.2	Cutting feed in Z - Axis (Infinitely Variable)	0 - 2000 mm/min			
2.8.3	Rapid feed in X - Axis (Min.)	6000 mm/min			
2.8.4	Rapid feed in Z - Axis (Min.)	6000 mm/min			
2.8.5	X - Axis Feed Drives / Motors [AC servo motors] Either Siemens or Fanuc digital type (detail like model, make, type, rating etc. should be submitted)	Vendor to offer			
2.8.6	Z-Axis Feed Drives / Motors [AC servo motors] Either Siemens or Fanuc digital type (detail like model, make, type, rating etc. should be submitted)	Vendor to offer			
2.8.7	Maximum cutting force permissible on Ram and at what extension	Vendor to inform			
2.8.8	Maximum permissible Cutting Force at Maximum Ram extension	Vendor to inform			
2.8.9	Permissible Cutting Force v / s Ram Projection - Diagram should be submitted.	Vendor to submit			
2.8.10	Feed back system for X & Z axes. Heidenhain linear scales with pressurized compressed air cleaning (Details should be submitted)	Vendor to offer with details			

2.8.11	Details of backlash free movement mechanism in X & Z axes should be submitted.	Vendor to submit			
2.8.12	Mechanism for locking X & Z axis	Vendor to inform			
<b>2.9</b>	<b>CONSTRUCTION DETAILS:</b>				
2.9.1	Vendor to furnish details of material, hardness & constructional details, including explanatory drawings, of various components/assemblies like Column, Cross Rail, Ram head, Table, Guide ways/slides, Feed Transmission system, Ram, Hydraulic and Lubrication system, Feedback system, counter balancing of Ram & Cross Rail etc .of the machine.	Vendor to submit details			
2.9.2	Video images on CD including hard copy explaining the technical features / Literature with photographs, drawings explaining the technical features should be enclosed with the offer	Vendor to submit			
<b>2.10</b>	<b>OPERATOR'S PLATFORM:</b>				
2.10.1	It is should be independent motorized type, movable / adjustable in vertical and horizontal directions. It should be able to reach almost to center of the Table in horizontal direction. Interlocks should be provided for its horizontal / downward movement against rotating Table and against the job (rotating or stationary ) to avoid collision / accident. Positions of the gates provided in the platform for Operator's convenience should be informed by the Vendor . Drawing / Details of the Operator's Platform should be submitted. A 15 Amp. Plug Point with ON/ OFF switch is also to be provided on the Platform	Vendor to offer			
2.10.2	Horizontal movement of complete Platform.	Vendor to furnish			
2.10.3	Vertical movement of complete Platform to cover total turning height.	Vendor to confirm			
2.10.4	Height of Platform Railing.	Vendor to furnish			
2.10.5	Weight Capacity of the Platform.	Vendor to furnish			
2.10.6	Minimum Position of Platform from Shop Floor.	Vendor to furnish			
2.10.7	Movable Chip / Splash Guard should be provided all around the Table with sufficient height to avoid spilling of Coolant and scattering of Chips on Operator's Platform and Shop Floor. Details of the same should be submitted.	Vendor to submit			
<b>2.11</b>	<b>HANDRAIL ON COLUMN AND LADDER</b>				
2.11.1	Handrail on column and Ladder shall be provided	Vendor to submit details			
<b>2.12</b>	<b>OPERATION AND CONTROL SYSTEM:</b>				
<b>2.12.1</b>	<b>OPERATOR'S PANEL:</b>				

2.12.1.1	Swiveling type operator's panel having complete CNC and machine control system with all displays of required configuration shall be provided and suitably located for convenient, efficient and safe operation of the machine. All switches with suitable interlocks should be within reach of operator of average height around 5.5 feet. All displays/indications should also be conveniently placed accordingly. The operator panel should be swivelable for ease of operation. Layout showing complete details should be submitted.	Vendor to offer			
2.12.1.2	An Auxiliary pendant, which can be taken to the table for fob setting and similar other purposes, should be provided.	Vendor to offer			
<b>2.12.2</b>	<b>CNC SYSTEM &amp; FEATURES :</b>				
2.12.2.1	Make : Fanuc / Siemens.	Vendor to confirm			
2.12.2.2	Type : PC based latest version.	Vendor to confirm			
2.12.2.3	Model: Sinumerik 840D with PC Version PCU 50, NCU 573.5 or Higher with Intel Pentium IV, 1GHz, 512 MB SDRAM (or higher), Windows XP Operating System or equivalent Fanuc system.. (Latest version, as available at the time of ordering, should be supplied).	Vendor to offer and submit details			
2.12.2.4	Details of Standard features - List to be submitted	Vendor to inform			
2.12.2.5	Details of optional features, recommended by vendor.	Vendor to inform			
2.12.2.6	Details of other optional features.	Vendor to inform			
2.12.2.7	Fast & User-friendly Graphics Simulation for checking of program prior to actual running. Block-search with calculation while running the program & Automatic retraction of Tool during threading (in case of power failure) should be pre-installed in the CNC system in addition to all other required/recommended software & features. Provision for automatic safe shut down of CNC control in case of power failure should also be provided.	Vendor to confirm			
2.12.2.8	The system should have OP 15 Operator's panel with TFT color display (15inch or more), 19 inch Machine control panel, Full CNC Keyboard with Qwerty Keys and Mouse / Trace ball or equivalent for Fanuc System, RS232 C interface for I/O devices, parallel interface for printer, VGA, MPI interface & USB, 2 Channels and expansion slots. The operator panel configuration will be as per Rittal VIP6000 or equivalent. The CNC system shall also have electronic hand wheels for all axes, USB Port with 1 GB Pen Drive for data input/output. Hard disk of 10GB or higher ( <b>Highest capacity available at the time of order shall be supplied</b> ), COM port for tele-diagnostics, Network ready with LAN and preinstalled system software & other required software's etc (Details should be submitted by Vendor)	Vendor to offer			

<b>2.12.3</b>	<b>MANUAL CONTROL :</b>			
2.12.3.1	Complete manual control of machine with required switches / keys should be provided on operator's panel for selection of required axis (X or Z), axis direction (+ or -), cutting feed (value at 100% of override switch), table rpm, cutting feed on/off, setting & display of axis position values on CNC display etc, for manual operation without using CNC program, CNC option Manual Turn or MDI mode. Diagram / Diagram/Sketch/ keys showing the required switches to be submitted by the vendor.	Vendor to offer		
<b>2.12.4</b>	<b>HAND HELD UNIT</b>			
2.12.4.1	Hand Held Unit with Axis selection and MPG of Siemens make or equivalent is to be offered with complete details.	Vendor to offer		
<b>2.12.5</b>	<b>UPS FOR CNC SYSTEM:</b>			
2.12.5.1	UPS unit including Siemens UPS module SITOP with rechargeable battery of sufficient time and having provision for unattended automatic shutdown feature for windows operating system & also to suit feature for automatic retraction tool during power failure to avoid damage to job/tool. (Battery charging /discharging time should be specified by vendor)	Vendor to offer & inform		
<b>2.13</b>	<b>MACHINE LIGHTS:</b>			
2.13.1	Machine Lights for sufficient illumination of complete working area on both sides of operator's platform should be provided for clear visibility.	Vendor to offer		
2.13.2	A magnetic base portable spot light with sufficiently long cable should also be provided.	Vendor to offer		
2.13.3	Any lights required in the foundation/ pit area shall also be foreseen and supplied by the vendor.	Vendor to offer		
2.13.4	All light fittings, consumables, adapters/receptacles should have compatibility with Indian equivalents	Vendor to offer		
2.13.5	Flashing / rotary type End of Cutting and Program Stop Light.	Vendor to offer		
<b>2.14</b>	<b>AIR CONDITIONERS:</b>			
2.14.1	Door / Panel mounted Air Conditioners with Dehumidifiers of suitable / sufficient capacity to be provided for all Electrical / Electronic Panels / Cabinets including Operator's Panel considering specified ambient conditions. Detailed specifications of the same are to be submitted.	Vendor to offer & submit		
<b>2.15</b>	<b>HYDRAULIC SYSTEM : Details should be Submitted by the Vendor</b>			
2.15.1	The System shall be of Re-circulating type. Hydraulic Tank shall be of centralized. Complete hydraulic system should be designed to avoid any leakage or spillage.	Vendor to offer & confirm		
2.15.2	Brand of hydraulic elements like Pumps, valves, switches should be : Rexroth / Vickers/Parker .	Vendor to offer & confirm		

2.15.3	Filtration System : Sufficient no. of filters (with electric clogging indicator and alarm on PLC) should be used to avoid frequent clogging of the filters and other maintenance related problems. Filter elements should be of make : EPE/Hydac	Vendor to offer & confirm			
2.15.4	Failure indication /Fail safe system.	Vendor to offer			
2.15.5	Automatic shut off provision. Details should be submitted.	Vendor to offer			
2.15.6	Suitable cooling system of sufficient capacity to maintain complete Hydraulic System ,hydrostatic oil etc. at a temperature not exceeding 40 deg C irrespective of the ambient conditions. Complete details should be submitted	Vendor to offer & submit			
2.15.7	Hydraulic pump capacity (flow / pressure)	Vendor to inform			
2.15.8	Each pump should have an independent motor. Tandem pumps should not be used	Vendor to confirm			
2.15.9	Necessary overload protection shall be provided in the hydraulic system.	Vendor to confirm			
2.15.10	<b>First filling of all required Oils &amp; Grease etc.</b> to be supplied by vendor. Indigenous (Indian) source or Indian equivalent & specifications of oils/ greases are also to be provided by the vendor.	Vendor to offer & submit			
2.15.11	<b>Method of Lubrication:</b> The lubrication system shall be centralized & forced feed lubrication to Table, Ram Head, Cross Rail & Sideways. Lubrication methods to other parts shall be explained.	Vendor to confirm & submit details.			
<b>2.16 ELECTRICAL :</b>					
2.16.1	415V + 10% / -10%, 50HZ +/-3 HZ, 3 Phase AC (3 wire system with out neutral) Power Supply Voltage will be provided by BHEL at a single point near the machine, as per layout recommended by Vendor. All types of cables, connections, circuit breakers etc. required for connecting BHEL's power supply point to different parts of the machine/control cabinets, shall be the responsibility of vendor. Requirement of grounding/earthing with required material details is to be informed by vendor well in advance so that same could be incorporated during construction of foundation.	Vendor to accept			
2.16.2	<b>Tropicalisation:</b> All electrical / electronic equipment shall be tropicalized to suit specified ambient & operating conditions.	Vendor to confirm			
2.16.3	All electrical & electronic control cabinets & panels should be dust and vermin proof	Vendor to confirm			
2.16.4	All electrical components in the cabinets should be mounted on DIN Rail	Vendor to confirm			
2.16.5	All electrical components shall have IP54 protection.	Vendor to confirm			
2.16.6	All electrical and electronic panels including operator's panel should be provided with CFL for sufficient illumination and power receptacles of 220Volts, 5/15 Amp AC. All adapters/receptacles should have compatibility with Indian equivalents.	Vendor to confirm			

2.16.7	Motors shall conform to IEC or Indian Standards	Vendor to confirm			
2.16.8	All cables moving with traversing axes should be installed in caterpillar / Drag chain. Additionally, all the cable trays required for laying of cables should be included in the offer.	Vendor to confirm			
2.16.9	Vendor should ensure the proper earthing for the machine and its peripherals.	Vendor to confirm			
2.16.10	The electrical components used shall be from reputed international makes such as Siemens / Telemecanique / Merlin Gerin / GE/ ABB and shall be accordance with DIN/IEC Standards.	Vendor to confirm			
2.16.11	<b>In-cycle hour counter</b> with reset facility for counting spindle & carriage running time, machine idle time, machine under maintenance time etc. and display the counted data on CNC display on video pages created by vendor.	Vendor to offer			
2.16.12	All the 3 phase electrical equipments' operating voltage shall be 415V 50Hz as per point 2.16.1 and to suit indian conditions.	Vendor to confirm			
<b>3.0</b>	<b>SAFETY ARRANGEMENTS: Following safety features in addition to other standard safety features should be provided on the machine:</b>				
3.1	Machine should have adequate and reliable safety interlocks / devices to avoid damage to the machine, work piece and the operator due to the malfunctioning or mistakes. Machine functions should be continuously monitored and alarm / warning indications through lights/ alarm number with messages (on CNC display and panels) should be available.	Vendor to offer			
3.2	A detailed list of all alarms / indications provided on machine should be submitted by the supplier.	Vendor to submit			
3.3	All the pipes, cables etc. on the machine should be well supported and protected. These should not create any hindrance to machine operator's movement for effective use of machine.	Vendor to offer			
3.4	All the rotating parts used on machine should be statically & dynamically balanced to avoid undue vibrations & noise.	Vendor to confirm			
3.5	Emergency Switches at suitable locations as per International Norms should be provided.	Vendor to offer			
3.6	Oil & water pipe lines should not run with electrical cable in the same trench.	Vendor to offer			
<b>4.0</b>	<b>ENVIRONMENTAL PERFORMANCE OF THE MACHINE : The Machine shall conform to following factors related to environment:</b>				
4.1	Maximum noise level shall be 85 dB(A) at normal load condition, 1 meter away from the machine with correction factor for back ground noise, if necessary. This will be measured as per international standards like DIN 45635-16. Supplier to demonstrate compliance to noise level, if asked for.	Vendor to confirm			

4.2	There shall not be any emissions from the machine except fumes of cutting fluid during machining.	Vendor to confirm			
4.3	There should not be any effluent from the machine. In case there are any effluents from the machine, requisite effluent treatment plant or pollution control device should be built into the machine by the supplier.	Vendor to confirm			
4.4	No hazardous chemicals shall be required to be used in the machine.	Vendor to confirm			
4.5	If any safety / environmental protection enclosure is required it should be built in the machine by the vendor.	Vendor to confirm			
4.6	Paint of the machine should be oil / coolant resistant and should not peel off and mixed up with coolant.	Vendor to confirm			
<b>5.0</b>	<b>ULTRA ISOLATION TRANSFORMER :</b>				
5.1	Indian make Ultra Isolation Transformer suitable for complete machine, its drives, controls, PLC etc. shall be supplied for unbalanced load & supply conditions considering specified power supply & ambient conditions.	Vendor to offer			
5.2	Make (NEEL, Aplab or Auto Electric)	Vendor to confirm			
5.3	Model and Rating	Vendor to inform			
5.4	Catalogue of the Ultra Isolation Transformer (copy of relevant pages) shall be submitted with the offer.	Vendor to submit			
<b>6.1</b>	<b>COMPRESSED AIR POINTS</b>				
6.1.1	Compressed Air point @ 6 Kg/cm <sup>2</sup> with manually ON/OFF Valve will be provided nearer to the machine. Any requirement of compressor air can be met from this facility.	Vendor to note and specify the requirement			
<b>6.2</b>	<b>TOOLINGS</b>				
6.2.1	The vendor shall furnish details of all tools ( <i>standard supply</i> ) like tool name, quantity etc., applicable for this machine.	Vendor to submit details.			
<b>7.0</b>	<b>DIAGNOSTIC SYSTEM</b>				
<b>7.1</b>	<b>TELE-DIAGNOSTIC SERVICE :</b>				
7.1.1	Tele-diagnostic service should be provided through International telephone lines along with required Hardware / Software package for the supplied CNC system for remote diagnosis and correction of the problems in both CNC System and PLC of the machine. This should be provided free of charge for the guarantee period. Terms and conditions for the service after guarantee period should be informed by vendor. Subsequently, it should be possible to use other platforms, such as Internet or ISDN, subject to their availability in future.	Vendor to offer			
<b>7.2</b>	<b>FAULT DIAGNOSTIC SYSTEM:</b>				

7.2.1	Supplier's own diagnostic system with required hardware and software should be supplied and installed on the CNC system. This should include customized auto-diagnostic system with supporting hardware and software which shows detailed cause and remedy for the fault on the display with full video diagnostic help for faults related to mechanical and electrical maintenance.	Vendor to offer			
7.2.2	Help guide should be provided to use both diagnostic systems	Vendor to submit details.			
<b>8.0</b>	<b>LEVELING &amp; ANCHORING SYSTEM</b>				
8.1	Complete anchoring system including foundation bolts, anchoring materials, fixators, leveling shoes etc should be supplied	Vendor to offer			
<b>9.0</b>	<b>TOOLS FOR ERECTION, OPERATION &amp; MAINTENANCE :</b>				
9.1	Special tools and equipment required for erection of the machine shall be brought by the vendor. Necessary tools like Torque Wrench, Spanners, Keys, grease guns etc. for operation and maintenance of the machine should be supplied. List of such tools should be submitted with offer	Vendor to offer			
<b>10.0</b>	<b>ESSENTIAL ACCESSORIES:</b>				
10.1	<b>AUTOMATIC TOOL CHANGER. All Tool Holder and Boring bars shall be mounted on ATC for direct clamping in ram through ATC cycle</b>	Vendor to offer			
10.1.1	Type	Vendor to inform			
10.1.2	No. of storage locations - 6 or more	Vendor to inform			
10.1.3	Tool shank (max)	40 mm x 40 mm			
10.1.4	Max tool diameter / width (all pockets filled)	Vendor to inform			
10.1.5	Max tool diameter (adjacent pockets empty)	Vendor to inform			
10.1.6	Max tool length.	Vendor to inform			
10.1.7	Tool change time (tool-to-tool)	Vendor to inform			
10.1.8	Tool change time (chip-to-chip)	Vendor to inform			
10.1.9	Tool selection method	Random			
10.1.10	Maximum Tool Overhang out of different Holders.	Vendor to inform			
10.1.11	Maximum Permissible Weight on each Pocket.	Vendor to inform			
10.1.12	Maximum Permissible Weight on Complete ATC.	Vendor to inform			
10.1.13	The Machine operation should be possible with or without referencing ATC.	Vendor to confirm			
10.1.14	ATC Drawing should be submitted with the offer.	Vendor to submit			
<b>10.2</b>	<b>GRINDING ATTACHMENT:</b>				

10.2.1	Suitable Grinding Attachment should be offered for Cylindrical (Internal & External both) as well as Face Grinding. Grinding wheel should clear ram in all conditions for cylindrical grinding. It should generate surface finish of 0.8 microns Ra value or better without any chatter or line marks.	Vendor to offer			
10.2.2	Minimum internal Grinding diameter and depth to be ground.	Dia 250 mm x 600 mm			
10.2.3	The grinding Unit should be supplied with its all required accessories for its' mounting/clamping on the ram, safe and integral power connections with tools for mounting grinding wheel on the unit etc	Vendor to offer and submit			
10.2.4	Balancing device for balancing of grinding wheel before mounting the wheel on grinding unit. Technical details to be submitted.	Vender to offer			
10.2.5	Programmable grinding cycles, ready for use for CNC controlled grinding & wheel dressing	Vender to offer			
10.2.6	Two sets of Grinding wheels for ID & OD Grinding operations	Vendor to offer			
10.2.7	Power	Vendor to inform			
10.2.8	Speed (Infinitely Variable)	Vendor to inform			
10.2.9	Details of the Drive viz. Make, Model etc.	Vendor to inform			
10.2.10	Power - Torque - Speed Diagram	Vendor to submit			
10.2.11	Maximum Diameter of the Wheel	Vendor to inform			
10.2.12	Minimum Diameter of the Wheel	Vendor to inform			
10.2.13	Width of the Wheel	Vendor to inform			
10.2.14	Provision of the Wheel Dressing	Vendor to inform			
10.2.15	Position of the Wheel Dresser. Drawing should be submitted.	Vendor to inform			
10.2.16	Vendor to confirm that sufficient protection for bearings, Guide Ways etc. has been provided.	Vendor to confirm			
10.2.17	Dimensional Details and Weight of Grinding Attachment	Vendor to inform			
<b>10.3</b>	<b>CHIP CONVEYOR and 2 Bins</b>				
10.3.1	Elevating chip conveyor to carry both short and curly chips efficiently & effectively to the chip bin on floor, should be provided at suitable location near to machine table and elevated to left side of the machine. Metallic chutes should be provided all around the table for smooth collection of chips up to opening of chip conveyor.	Vendor to offer			
10.3.2	Type of chip conveyor	Hinged type or superior			
10.3.3	Width of conveyor	Vendor to inform			
10.3.4	Elevation of chip conveyor for chip bin	Vendor to inform			
10.3.5	Material of chip conveyor (should be rust resistant)	Vendor to inform			

10.3.6	Provision for smooth collection of chips from all-around table to the conveyor and for avoiding clogging of chips should be provided. Removable Grill/Mesh type rigid covers should be provided above some portion of the chip conveyor (which is under shop floor ) to enable machine operator's access to chip conveyor from shop floor for disposal of scattered chip conveyor. Detail for the same should be submitted by vendor.	Vendor to offer			
10.3.7	Operation of chip conveyor (forward & reverse) should be possible through push buttons on operator's panel and also near Chips disposal point/chip bin.	Vendor to confirm			
10.3.8	Layout showing location of chip conveyor should be submitted.	Vendor to confirm			
10.3.9	Two chip bins of appropriate size of Indian make, with wheels, lifting hooks & handle for movement suitable for this machine, should also be supplied.	Vendor to offer			
<b>10.4</b>	<b>MEASURING SYSTEMS:</b>				
10.4.1	Automatic Job Measuring System comprising of Renishaw make Wireless system, with measuring cycles, calibration system and all types of probes / styli required for measuring all machined dimensions of the prove-out components. Vendor to furnish detailed description of the system along with offer.	Vendor to furnish			
10.4.2	Automatic Tool Offset measuring system with measuring cycles, calibration system etc suitable for all types of tools recommended for prove-out components. Vendor to furnish detailed description of the system along with offer.	Vendor to furnish			
<b>10.5</b>	<b>ADDITIONAL TOOL HOLDERS:</b>				
10.5.1	Itemized breakup of any other tools, tool holders, inserts etc, ( <b>Other than standard supply</b> ) recommended by the vendor. ( <b>Unit Price of each item of spare should be offered in the price bid</b> )	Vender to offer			
<b>11.0</b>	<b>SPARES:</b>				
11.1	Itemized breakup of mechanical, hydraulic, electrical and electronic spares used on the machine in sufficient quantity as per recommendation of Vendor for 2 years of trouble free operation on three shifts continuous running basis should be offered by vendor. The list to include following, in addition to other recommended spares: ( <b>Unit Price of each item of spare should be offered in the price bid</b> )	Vender to offer			
	<b>a) Mechanical &amp; Hydraulic Spares:</b> All types of Pumps, Valves, Pressure Switches, Transducers, Flow Switches, Filters, Seals, O-rings, Hydraulic Hoses etc.	Vender to offer			

	<b>b) Electrical /Electronic / CNC Spares:</b> All types of Relays, Contactors, Proximity Switches, Push Buttons, Indicating Lamps, Semiconductor Fuses, Special Fuses, Circuit Breakers, Main Power Switch, Encoders, Scanning Heads for Linear Scales, MMC module, NCU module, Operator's panel with Display Unit, I/O Cards for PLC, Servo Motors for Feed Drives, Power Module & Control Cards for Main Drive as well as Feed Drives etc.	Vender to offer			
11.2	All types of spares for total machine and accessories should be available for at least ten years after supply of the machine. If machine or control is likely to become obsolete in this period, the vendor should inform BHEL sufficiently in advance and provide drawings of parts / details of spares & suppliers to enable BHEL to procure these in advance, if required	Vender to offer			
11.3	Recommended set of spares for all attachments are to be offered with details.	Vender to offer			
11.4	Vendor to confirm that complete list of spares for machine and accessories, along with specification / type / model, and name & address of the spare supplier shall be furnished along with documentation to be supplied with the machine.	Vender to offer			
<b>12.0</b>	<b>DOCUMENTATION:</b> Five sets of following documents (Hard copies) in English language should be supplied along with the machine				
12.1	Operating manuals of Machine & CNC system	Vendor to confirm			
12.2	Programing Manuals of Machine & CNC system				
12.3	Detailed Maintenance manual of machine with all drawings of machine assemblies/sub-assemblies/parts including Electrical / Pneumatic/ Coolant / Hydraulic circuit diagrams. All Assembly/ Sub Assembly Drawings shall be supplied with the part list also				
12.4	Maintenance, Interface & Commissioning manuals for CNC system, spindle & feed drives.				
12.5	Manufacturing drawings for all supplied tool holders, coolant connections, adapters, sleeves, fixtures etc.				
12.6	Catalogues, O&M Manuals of all bought out items including drawings, wherever applicable.				
12.7	Detailed specification of all rubber items and hydraulic/lube fittings.				
12.8	Operating Manuals, Maintenance Manuals & Catalogues for supplied Automatic Tool Offset & Job Measuring Systems and Isolation Transformer and all supplied Accessories.				
12.9	PLC program print-outs with comments in English.				
12.10	PLC program on CD, NC data & PLC data on CD.				

12.11	Complete back-up of hard disk on GHOST CD and clear written Instructions (3 copies) to take back-up and reloading of a new hard disk.	Vendor to confirm			
12.12	Complete Master List of parts used in the machine shall be submitted by the vendor in English language.				
12.13	One additional set of all the above documentation on CD ROM, wherever possible.				
<b>13.0</b>	<b>TRAINING</b>				
13.1	Four BHEL Persons should be trained at supplier's Works for mutually agreed period in the area of (a) CNC Part Programming / Technology, Use of all CNC Features, Programming for Measuring Systems & supplied accessories etc. (b) Electrical, Electronic & CNC maintenance for machine & other supplied equipments (c) Mechanical & Hydraulic maintenance of the machine & other supplied equipments (d) Operation of the machine & other supplied equipments.	Vendor to offer			
13.2	Air-fare, boarding & lodging for the trainees shall be borne by BHEL.	For vendors information			
13.3	Competent, English speaking experts shall be arranged by the vendor during training for satisfactory & effective training of BHEL personnel.	Vendor to accept and confirm			
13.4	Vendor to quote for training on per diem basis	Vendor to quote			
13.5	Vendor should commit to organize training of Electronics Engineer and Programmer at the CNC System Manufacturer's works for advanced features and specialized training if so required by BHEL	Vender to offer			
<b>14.0</b>	<b>FOUNDATION :</b>				
14.1	Vendor shall submit the preliminary layout drawing for getting BHEL's approval within one month from the date of Letter of Intent (LOI). Soil condition data will be furnished by BHEL along with the approval. Complete Foundation Design including details viz. static / dynamic load details etc. and Final Layout drawings shall be submitted by the supplier within <b>three months</b> after getting BHEL's approval. The layout should consist of all requirements pertaining to complete machine including space requirement for Isolation Transformer, Chip Bin & any other accessories. BHEL shall construct complete foundation for the machine under supervision of supplier. Vendor should arrange equipments required for the testing of foundation, if required by the vendor. The vendor shall also indicate detailed specifications of grouting compound and Grouting procedure etc. for foundation bolts of the machine.	Vendor to accept and offer			

<b>15.0</b>	<b>ERECTION &amp; COMMISSIONING</b>				
15.1	Supplier to take full responsibility for carrying out the erection, start up, testing of machine, it's control & all types of other supplied equipment, machining of test pieces etc. Service requirement like power, air & water shall be provided by BHEL at only one point to be indicated by supplier in their foundation/layout drawings. Other requirements like crane and helping personnel shall also be provided by BHEL. Details of these requirements should be informed by vendor in advance.	Vendor to offer			
15.2	Erection & Commissioning of Isolation Transformer shall also be responsibility of the vendor.	Vendor to offer			
15.3	All tests, as mentioned at <b>clause 19</b> (Machine Acceptance) shall form part of the commissioning activity.	Vendor to accept			
15.4	Tools, Tackles, Instruments and other necessary equipment including Laser equipment required to carry out all above activities should be brought by the supplier. .	Vendor to accept			
15.5	Commissioning spares, required for commissioning of the machine within stipulated time, shall be brought by the supplier on returnable basis.	Vendor to accept			
15.6	All Cover Plates with painting required for the machine and its peripherals including pits, if any, shall be supplied and installed by the vendor.	Vendor to accept			
15.7	Portion, if any, of the machine, accessories and other supplied items where paint has rubbed off or peeled during transit or erection should be repainted and merged with the original surrounding paint by the vendor. For this purpose, the vendor should supply sufficient quantity of touch-up paint of various colors of paint used.	Vender to offer			
15.8	Schedule of Erection and Commissioning shall be submitted with the offer.	Vendor to submit			
15.9	Charges, duration, terms & conditions for E&C should be furnished in detail separately by vendor along with offer.	Vendor to submit			
<b>16.0</b>	<b>ACCURACIES:</b>				
<b>16.1</b>	<b>GEOMETRICAL ACCURACIES :</b>				
16.1.1	Geometrical Accuracy Tests shall be in accordance with DIN 8609-3/ ISO 3655 standard or equivalent applicable standard. Detailed Test Charts for the same, clearly showing the accuracies can be achieved on the machine, shall also be Submitted with the offer.	Vender to specify			
	a. Table Flatness	Vender to inform			
	b. Table radial run out	Vender to inform			
	c. Table axial run out	Vender to inform			

	d. Cylindricity of turning	Vender to inform			
	e. True roundness of turning	Vender to inform			
	f. Facial run outs	Vender to inform			
	g. Ram travel in X-axis	Vender to inform			
	h. Ram travel in Z-axis	Vender to inform			
16.1.2	All the above accuracies should be demonstrated to BHEL engineers during pre-acceptance at Suppliers works and during Erection & Commissioning at BHEL Works.	Vendor to offer, confirm and submit			
16.2	<b>MACHINE POSITIONING ACCURACIES &amp; REPEATABILITY: Should be measured as per VDI/DGQ 3441 (Latest Revision) using LASER INTERFEROMETER.</b>	Vendor to confirm			
16.2.1	Positioning accuracy in X axis (Pa) per 1000 mm	0.015 mm			
16.2.2	Positioning accuracy in Z axis (Pa) per 1000 mm	0.010 mm			
16.2.3	Repeatability in X axis (Ps)	0.010 mm			
16.2.4	Repeatability in Z axis (Ps)	0.005 mm			
16.2.5	Positioning accuracy over entire traverse in X axis (Pa)	Vendor to specify			
16.2.6	Positioning accuracy over entire traverse in Z axis (Pa)	Vendor to specify			
16.2.7	Total positioning error along X & Z axes per 1000 mm (P)	Vender to inform			
16.2.8	Total positioning error along X & Z axes over entire traverse (P)	Vender to inform			
16.2.9	All the above accuracies should be demonstrated to BHEL engineers during pre-acceptance at Suppliers works and during Erection & Commissioning at BHEL Works	Vendor to offer			
17.0	<b>AMBIENT CONDITIONS &amp; THERMAL STABILITY :</b>				
17.1	Total machine including CNC system and all supplied items should work trouble free and efficiently under following operating conditions and should give specified accuracies. Power Supply: Voltage: 415 V - 10%, +10% Frequency: 50 Hz +3%, - 3% No. of phases = 3 Ambient Conditions: Temperature = 5 to 45 degree Celsius Relative Humidity = 95% max. (Vendor to confirm that machine is suitable for above and details of provisions on the machine for the same are to be furnished by Vendor)	Vendor to accept and confirm			

17.2	Weather conditions are tropical, Atmosphere may be dust laden during some part of the year. Machine shall be kept in the normal shop floor condition. Max. temperature variation is up to 25 deg Celsius in 24 hours. (Vendor to confirm that machine is suitable for above and details of provisions on the machine for the same are to be furnished by Vendor)	Vendor to accept and confirm			
17.3	Thermal Stability of the complete machine keeping in view specified Ambient Conditions and accuracy requirements of BHEL components and trouble free operation of the machine should be ensured by vendor. (Confirm that machine is suitable for above and details of provisions on the machine for the same should be furnished)	Vendor to accept and confirm			
17.4	The machine, including attachments and accessories, should be suitable for 24 hrs. continuous operation to its full capacity for 24 hour a day and 7 days a week throughout. Vendor to ensure and confirm the same.	Vendor to accept and confirm			
<b>18.0</b>	<b>PROVE OUT OF BHEL COMPONENTS :</b>				
18.1	Drawings <b>TE-SKT-4-0208</b> and <b>TE-SKT-4-0209</b> for prove out components are enclosed.	Vendor to note			
18.2	Vendor to submit preliminary process, time study & tool list recommended by them along with the offer.	Vendor to submit			
18.3	Vendor to supply one set of tools for the enclosed prove out tender drawings in case of ordering.	Vendor to supply			
18.4	However supplier shall prove <b>any one of the tender component at BHEL works</b> . Supply of trial piece is BHEL scope.	Vendor to note			
18.5	During prove out, all tools shall be set by using supplied Tool Offset Measuring System and final job inspection shall be done by supplied Job Measuring System. Vendor shall be responsible for any deviation/rejection in prove out component due to wrong machining or malfunctioning of the machine during prove out machining and also for the delay in machining due to improper recommended tooling etc. The cost of such deviation / rejection, if any, shall be refunded by the vendor to BHEL.	Vendor to note			
<b>19.0</b>	<b>MACHINE ACCEPTANCE: (Tests/Activities should be Performed by Vendor)</b>				
<b>19.1</b>	<b>Tests/Activities should be carried out at supplier's works on the machine before dispatch :</b>				
19.1.1	Geometrical accuracies as per test chart DIN 8609-3.	Vendor to accept & confirm			
19.1.2	Positioning accuracies as per VDI-DGQ/3441/International Standard.	Vendor to accept & confirm			
19.1.3	The machine should be tested for continuous running of 48 hrs. If any break down occurs during this test, the test should be repeated for 48 hrs from that time.	Vendor to accept and confirm			
19.1.4	Demonstration of all features of the machine, control system & accessories	Vendor to accept and confirm			

19.1.5	Machining of test piece as per ISO or any relevant International Standard. Vendor to supply test piece and tooling for it's machining.	Vendor to accept and confirm				
<b>19.2 Tests/Activities - to be carried out at BHEL works while commissioning the machine :</b>						
19.2.1	Geometrical accuracies as per test chart DIN 8609-3.	Vendor to accept and confirm				
19.2.2	Positioning accuracies as per VDI-DGQ/3441/International Standard.					
19.2.3	Full load test to demonstrate the maximum power & cutting capacity of the machine.					
19.2.4	The machine should be tested for continuous running of 48 hrs. If any break down occurs during this test, the test should be repeated for 48 hrs from that time.					
19.2.5	Demonstration of all features of the machine, control system & accessories to the satisfaction of BHEL for efficient and effective use of the machine					
19.2.6	Machining of test piece as per ISO or any relevant International Standard. Vendor to supply test piece and tooling for it's machining.		Vendor to accept and confirm			
19.2.7	Prove out of tender components					
19.2.8	Two weeks supervision of independent operation of machine by BHEL after job prove out					
19.2.9	Training of BHEL machine operators in operation of complete machine & accessories etc by the supplier's experts / engineers during their stay at BHEL works					
19.2.10	Demonstration by actual use of all supplied attachments and accessories to their full capacity.					
<b>20.0 PACKING:</b>						
20.1	Sea worthy & rigid packing for all items of complete machine, CNC System, all Accessories and other supplied items to avoid any damage/loss in transit. When machine is despatched in containers, all small loose items shall be suitably packed in boxes	Vendor to offer and confirm				
20.2	The container shall be of top opening type and packing list shall be furnished container wise with weight.	Vendor to agree				
<b>21.0 GUARANTEE :</b>						
21.1	24 months from the date of acceptance of the machine at BHEL.	Vendor to offer				
<b>22.0 GENERAL :</b>						
22.1	Machine Model	Vendor to inform				
22.2	Total connected load (KVA):	Vendor to inform				
22.3	Floor area required (Length, Width, Height) for complete machine & accessories	Vendor to inform				

22.4	Painting of Machine / Electrical Panels : RAL 6011 Apple Green (Polyurethane Paint)	Vendor to inform			
22.5	Total weight of the machine	Vendor to inform			
22.6	Weight of heaviest part of machine	Vendor to inform			
22.7	Weight of the heaviest assembly / sub-assembly of the Machine	Vendor to inform			
22.8	Dimensions of largest part/ sub-assembly/ assembly of the machine	Vendor to inform			
22.9	Vendor to submit, along with offer, reference list of customers where similar machines have been supplied mentioning broad specifications of the supplied machine i.e. Model, Table diameter, Load Capacity, Maximum Turning Diameter, Max Turning Height, Main Drive Rating, CNC System etc	Vendor to submit			
22.10	Detailed catalogues, sketch/ photographs of the m/c. and accessories/ attachments should be submitted with the offer.	Vendor to submit			
22.11	Hydraulic, Pneumatic & oil pipings should be preferably metallic except places where flexible pipings are essential. All the pipes required for the same shall be included in the standard scope of the machine.	Vendor to confirm			
<b>23.0</b>	<b>NETWORKING:</b>				
23.1	Machine control should have necessary hardware and software for interfacing with gigabit Ethernet Local Area Network with 100 MB/sec through UTP cables for NC program and other related data transfer. This network to be connected to wide area network/Internet. The networking should have following capabilities.	Vendor to offer			
	a) The machine shall appear as a node in the Entire Network. (Network Neighborhood)	Vendor to offer			
	b) The program transfer shall be by simple copy and paste method provided sharing access is allowed between any PC and the machine across the network.	Vendor to offer			
	c) The program transfer between CNC system and network should also be possible in CNC Mode.	Vendor to offer			
<b>23.2</b>	<b>MACHINE MONITORING SYSTEM (MMS) SIGNALS</b>				
23.2.1	Following MMS signals would be made available on a specifically earmarked terminal strip. These MMS signals would be sourced from PLC output card separately.				
	a) Control ON	Vendor to offer			
	b) Cycle ON				
	c) Spindle Running				
	d) Feed Active (Any of the axes moving)				
	e) M30 (Program Stop)				

**NOTE: Existing unused foundation to be used. Kindly refer Annexure - II and the Foundation drawing attached.**

# ANNEXURE - 11 TO TENDER BAP/CAPITAL/2012-13/OT-3

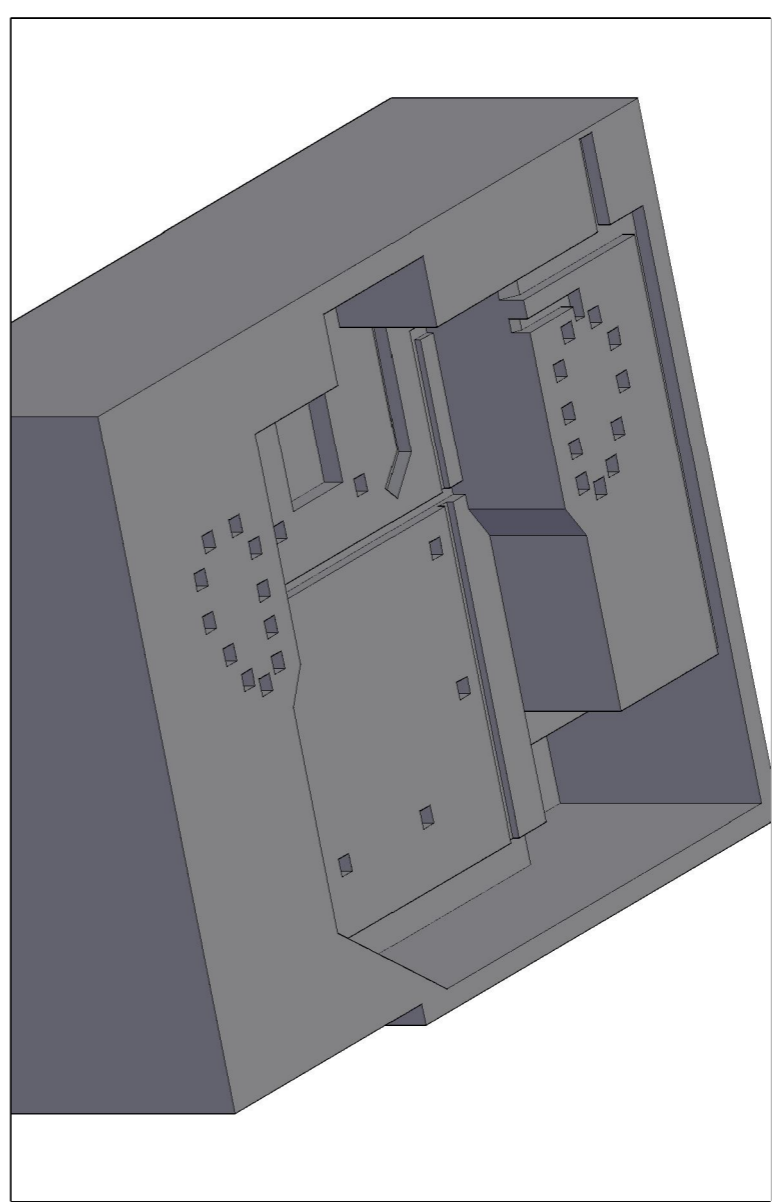
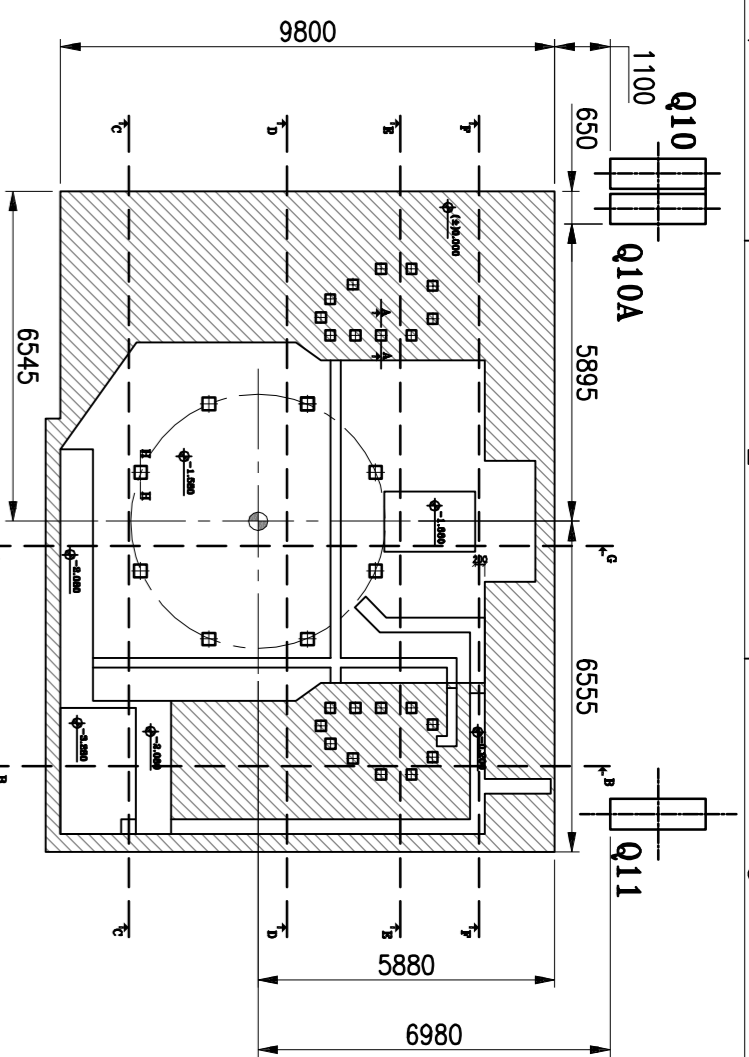
Indent No: C82920004 Dt:24.05.12

## USAGE OF EXISTING UNUSED FOUNDATION FOR 6METER CNC VTL

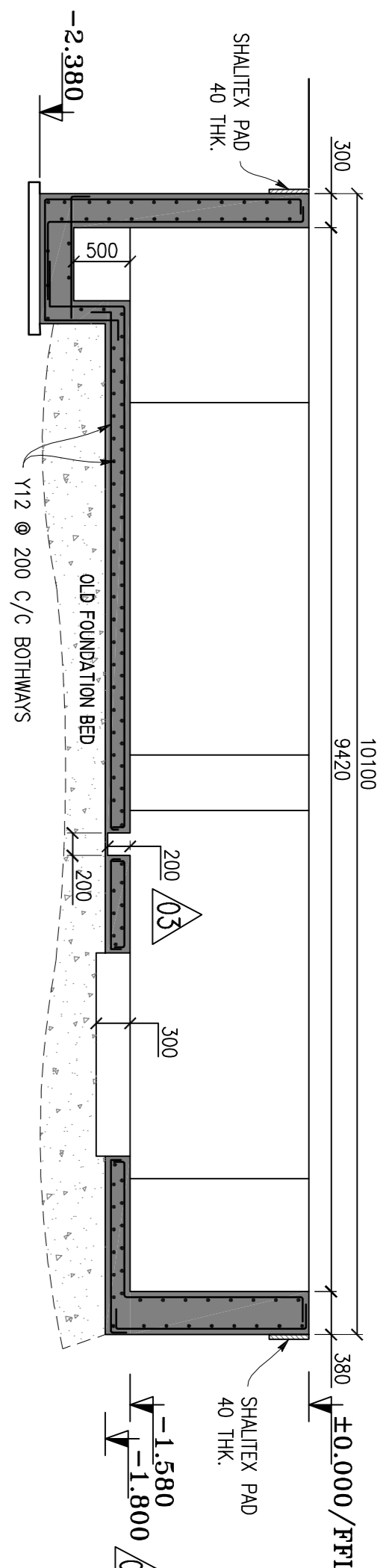
- 1 Vendor shall use the existing unused foundation at BHEL works.
- 2 Drawing of existing foundation is attached for vendor's reference & use
- 3 The Scope & Responsibility of required modifications if any on the foundation to suit the machine lies with the vendor only.
- 4 Cost of the above to be included in the "ERECTION & COMMISSIONING" cost.
- 5 BHEL will provide Crane, Power and Water only for this purpose.
- 6 Duration for Erection & Commissioning shall be a Maximum of 10 weeks.
- 7 Erection & Commissioning Charges shall be a max of 5%



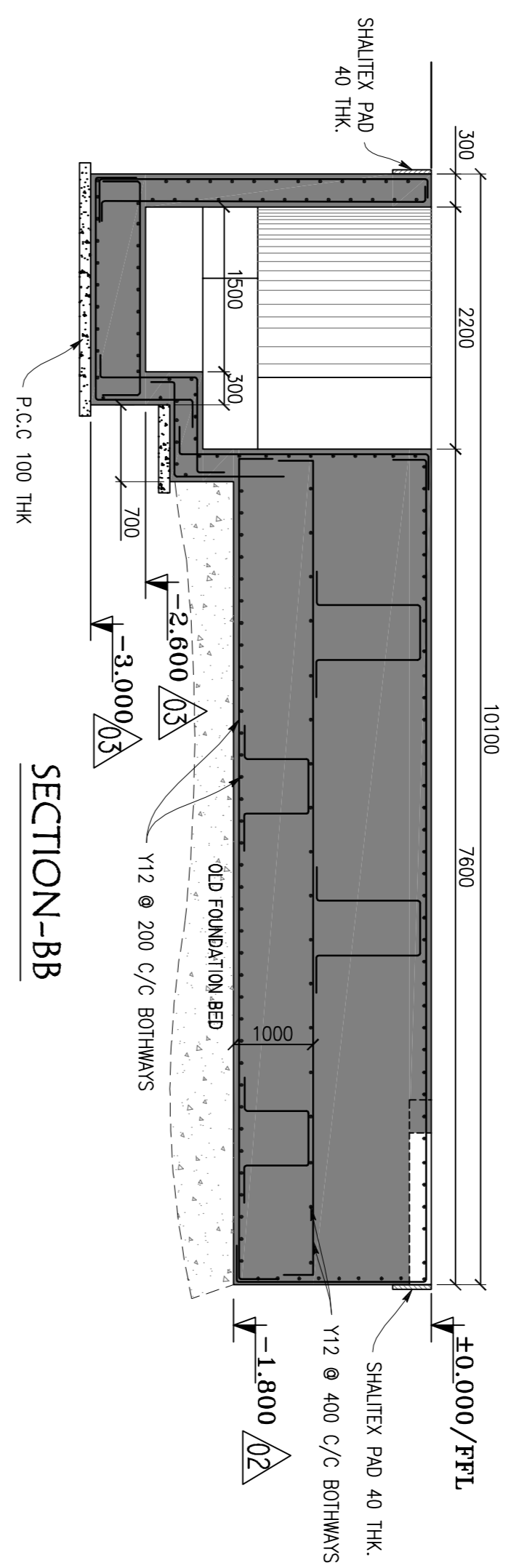
Manager / MTD



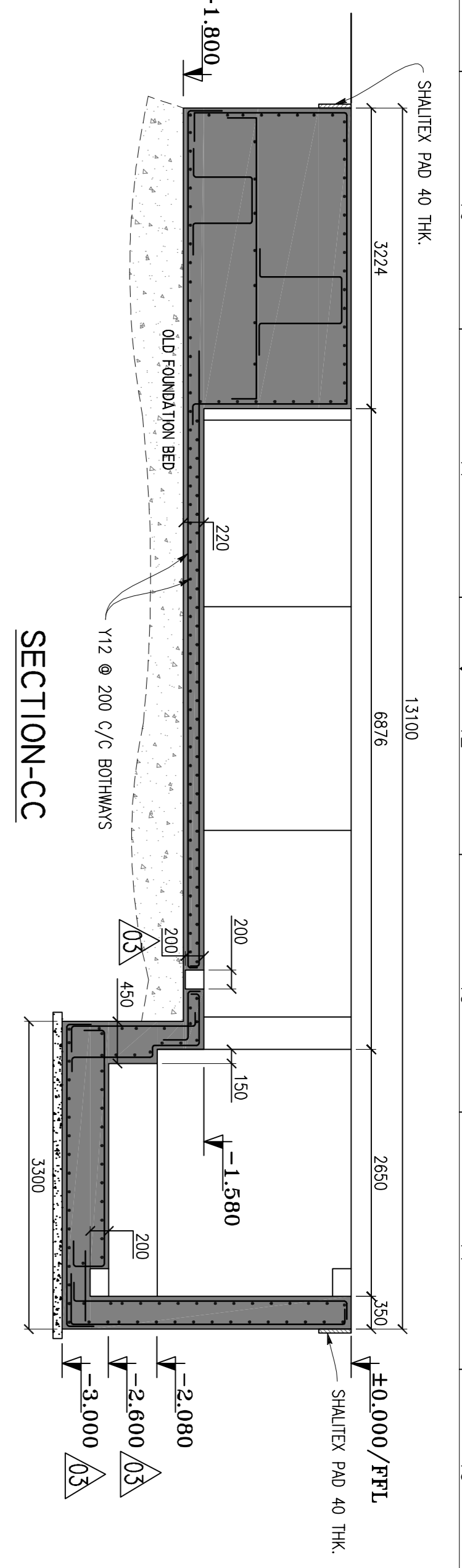
3D VIEW



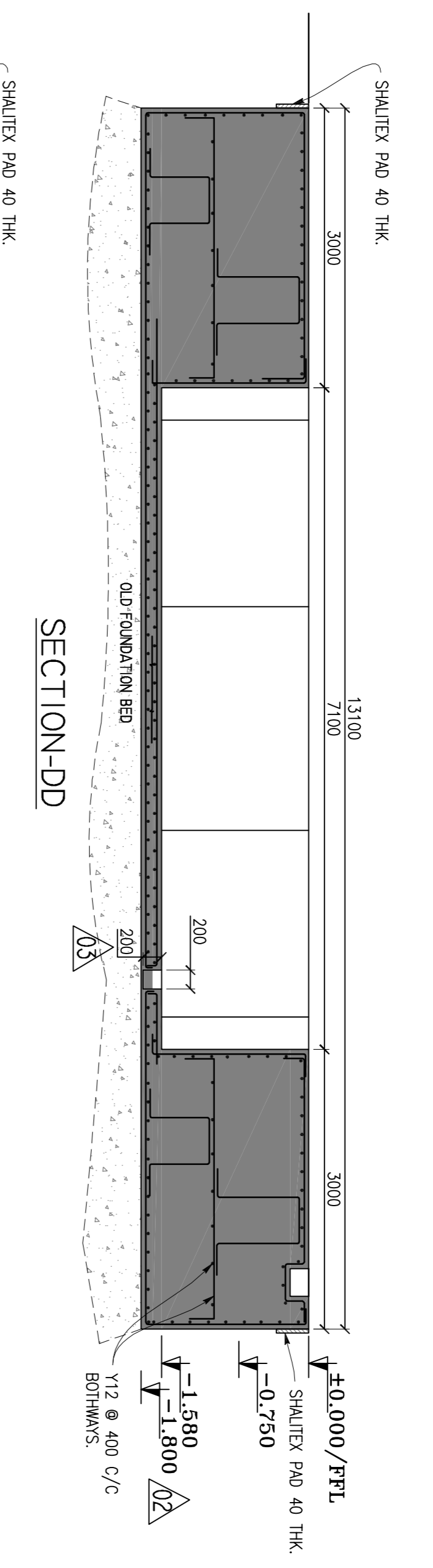
SECTION-GG



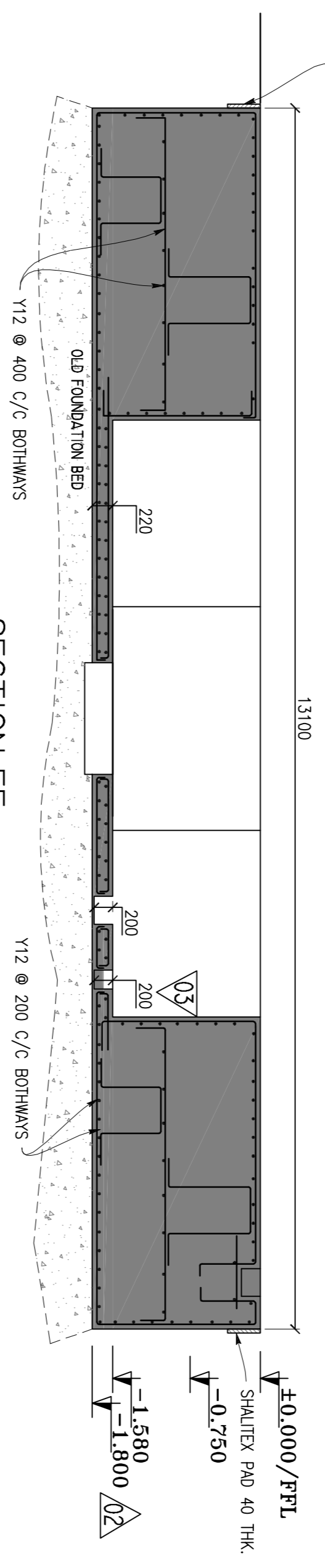
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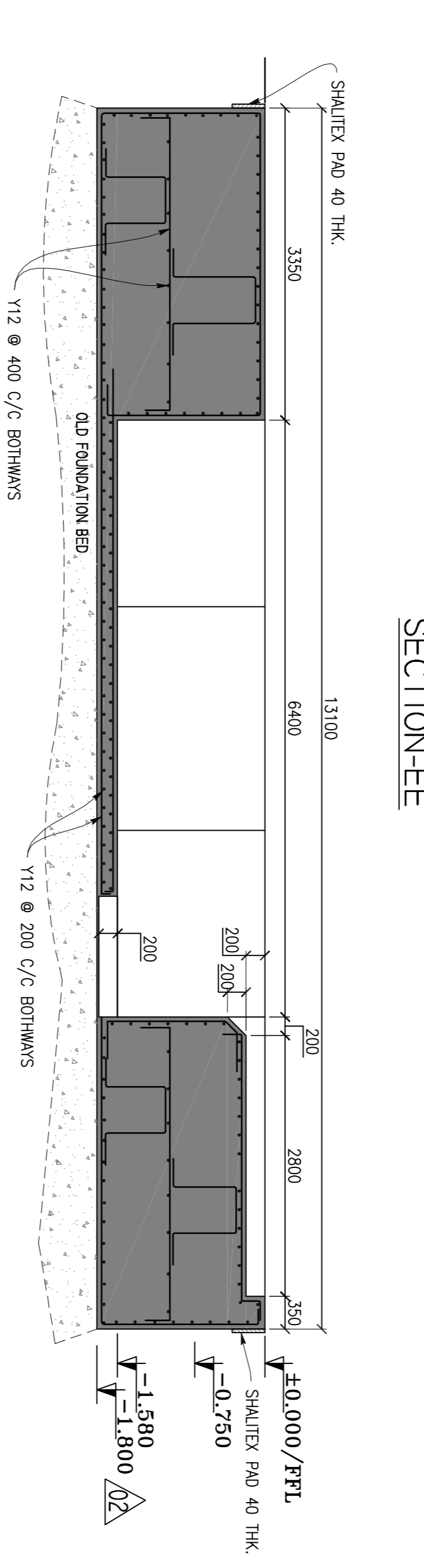
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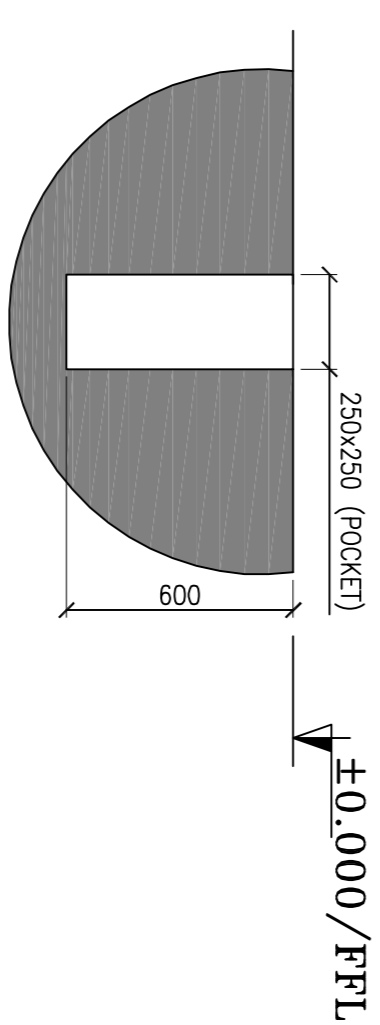
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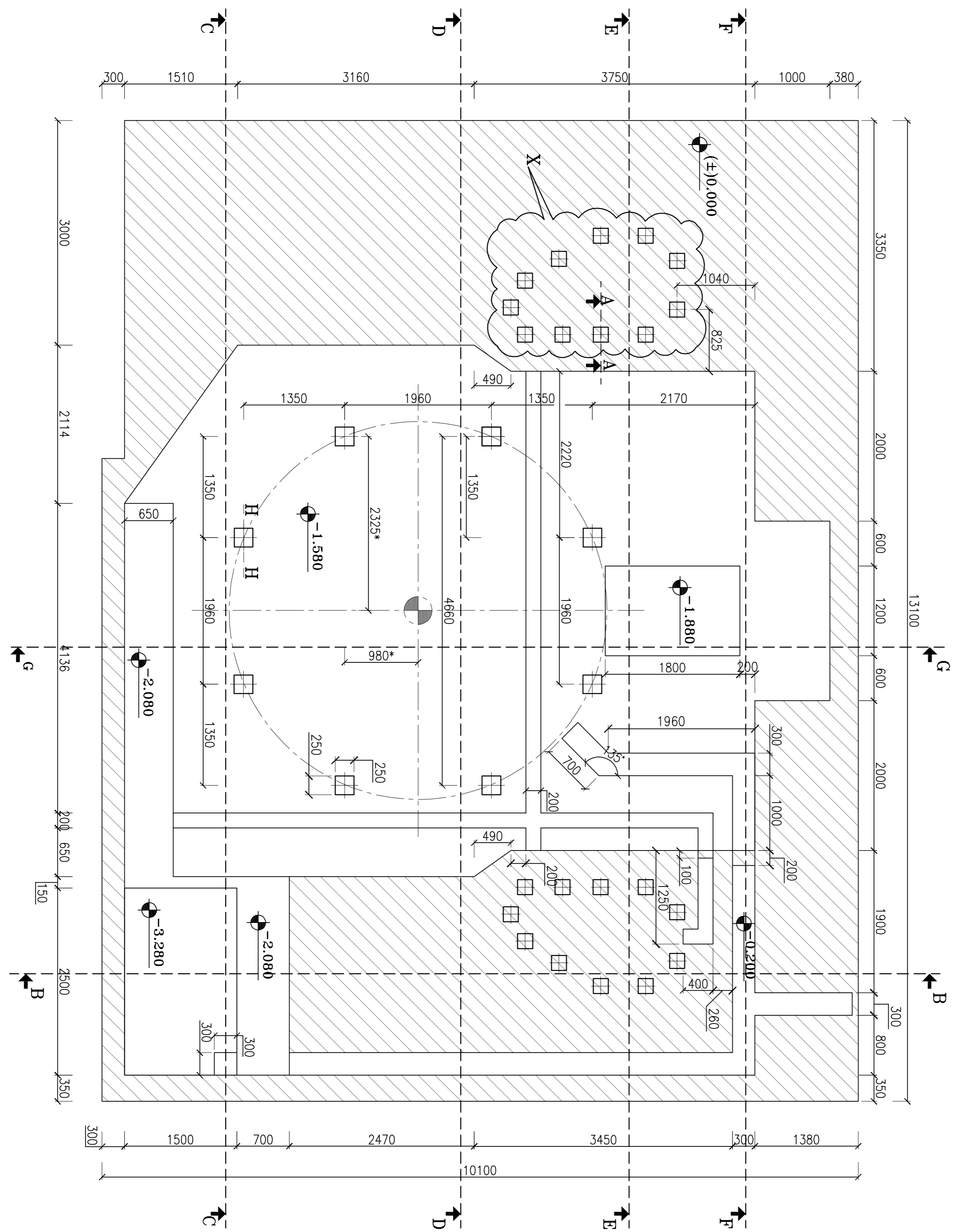
SECTION-EE



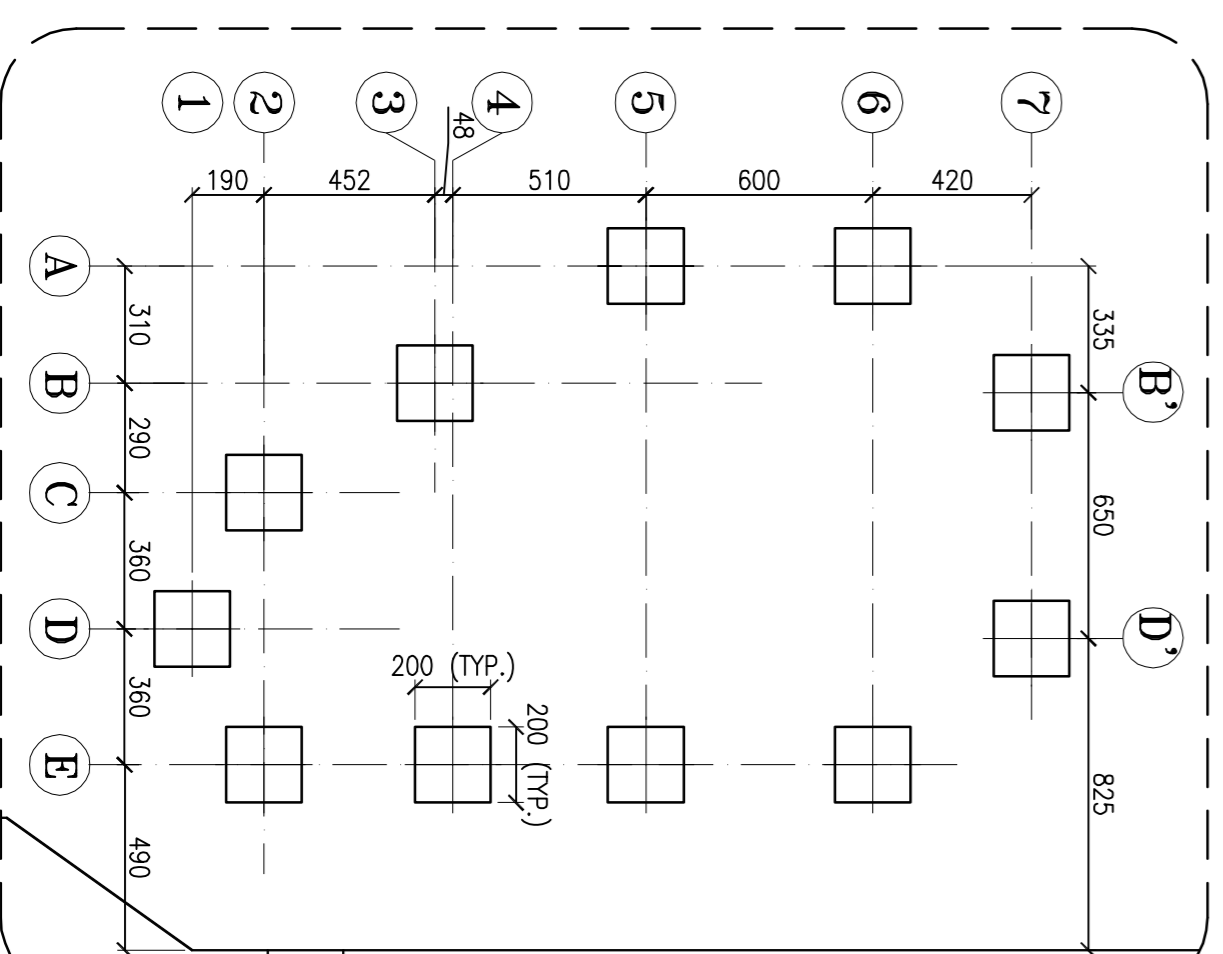
SECTION-FF



SECTION-AA



PLAN



DETAIL-X

- NOTES-**
1. ALL DIMENSIONS ARE IN MM & LEVELS ARE IN METER UNLESS NOTED OTHERWISE.
  2. ONLY WRITTEN DIMENSION SHALL BE FOLLOWED
  3. M25 CONCRETE & STEEL F415 SHALL BE FOLLOWED
  4. COVER TO THE REINFORCEMENT FOR ALL SIDES IS 50 MM
  5. THIS DRG PREPARED BASED ON DRG NO-11601.900.000.0 (S680-CNC-IS-MS-4H)
  6. MACHINE LAYOUT PREPARED BASED ON DWG NO-ITE-SCT-4-0334.0721.08.10
  7. PROVIDE 40MM THK. SHALTEX PAD AROUND THE FOUNDATION TO ISOLATE FROM THE SHOP FLOOR.
  8. ALL REINFORCEMENTS ARE Y12 @ 200 C/C BOTHWAYS UNLESS NOTED OTHERWISE & CHAR ROD Y20 WHEREVER REQUIRED.

REV.	DATE	ALTERED/CHECKED	DESIGN NO.	SCALE
1				SCALE: 1:50
2				
3				
4				

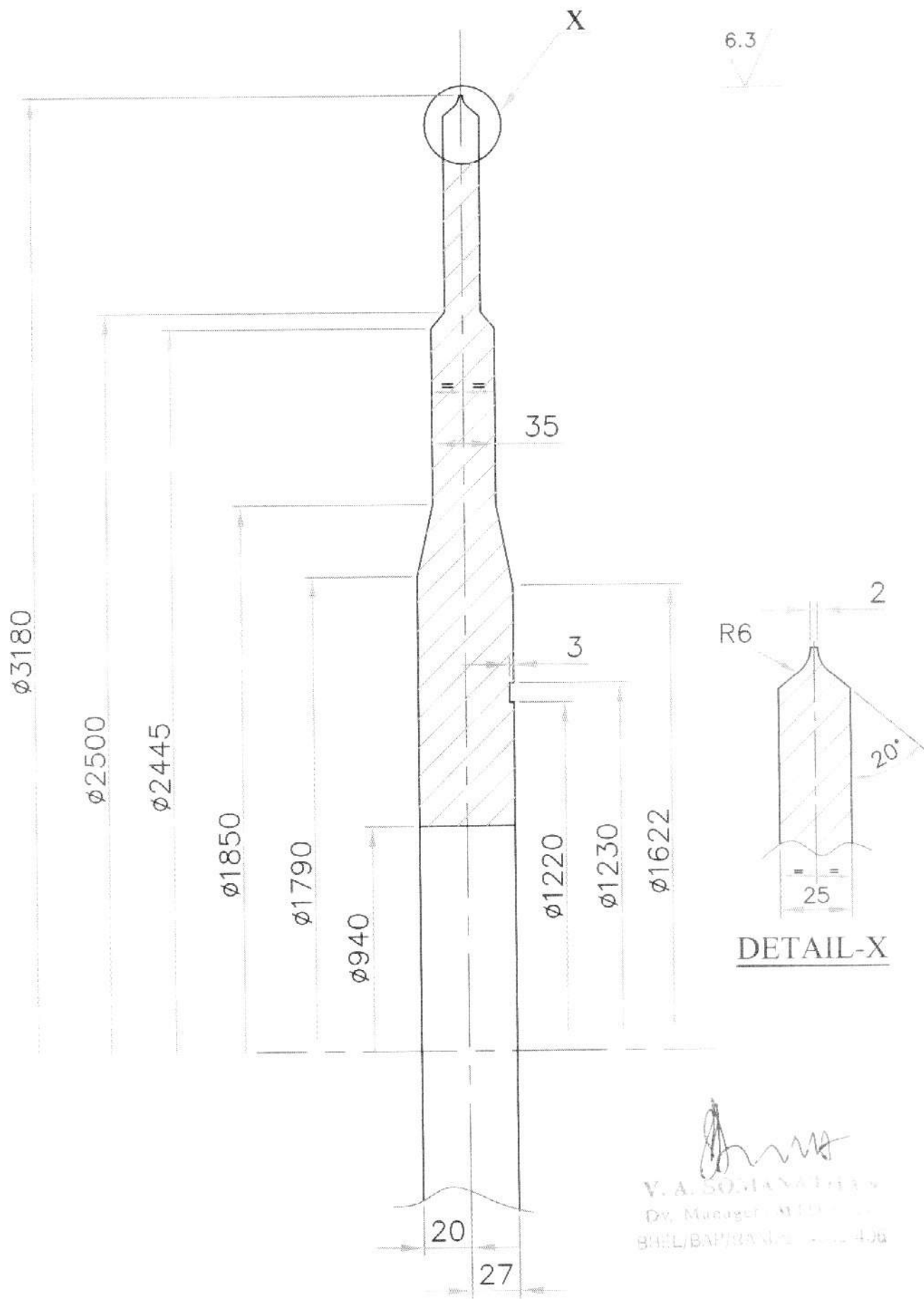
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4					

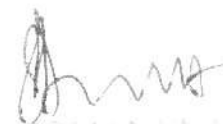
  

NO.	DESCRIPTION	DATE
1	DESIGNED BY: BHARAT HEMJI ELECTRONICS LTD.	8/11/2010
2	CHECKED BY: BHARAT HEMJI ELECTRONICS LTD.	8/11/2010
3	APPROVED BY: BHARAT HEMJI ELECTRONICS LTD.	8/11/2010
4	DRAWING NUMBER: BH-E-BAP-C10-1820	
5	REV. SHEETS: 03 / 1/1	

PROJECT NAME: ---  
 PROJECT NO.: ---  
 PROJECT TITLE: ---  
 FILE FOLDER PATH: E:\DWG-01\FACTORY\FINISHED  
 PLOTTED DATE: Tue, 28-Jun-2012 10:57 AM





  
 V. A. SOMANATHAN  
 Dy. Manager  
 BHEL/BAP/BAP/.../.../40a

TITLE:	<b>PART OF CENTER PLATE</b>	MATERIAL	NAXTRA 70
DRG NO:	<b>TE-SKT-4-0208</b> (REF DRG No: /2-56-228-02632/01)	DESCRIPTION	50xD3200
		WEIGHT	3150Kg